STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

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STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33636.1.1 I.D. NO. B-4299

F.A. PROJECT BRSTP-1006(14)

COUNTY WAKE

PROJECT DESCRIPTION BRIDGE NO. 255 ON

-L- (SR 1006) OVER ECHO BRANCH

CREEK AT STATION 22+70

INVENTORY

				P.E.		
STATE	PROLNO.	F.A.PROJ.NO.	T	DESCRIPTION		
N.C.	33636))	1	11		
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INVESTIGATED BY T.P. MOOREFIELD PERSONNEL J.L. PEDRO

CHECKED BY D.N. ARGENBRIGHT

MARCH 2005

CONSULTANT: S&ME

SUBMITTED BY T.P. MOOREFIELD

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FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE
CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

DRAWN BY: J. L. PEDRO

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

	COLL AND DOOR LECEND TED	AC CYMDOLC AND ARREST AMIONIC				
		IS, SYMBOLS, AND ABBREVIATIONS				
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS			
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS	WELL GRADED: INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM: INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE, (ALSO	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.			
WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586), SOIL	POORLY GRADED) GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE	AQUIFER - A WATER BEARING FORMATION OR STRATA.			
CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE:	ANGULARITY OF GRAINS	OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.			
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR,	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS,			
VERY STIFF, GRAY SULTY CLAY, MOIST WITH INTERBEDDED FINE SAND LIVERS, HISHLY PLASTIC, A-7-6	SUBANGULAR, SUBROUNDED, DR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.	OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.			
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	FINE TO COURSE CRAIN YOUTONS AND AFT ANDRONY DOOR THAT	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE			
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE.	GROUND SURFACE.			
CLASS. (35% PASSING *200) (35% PASSING *200)	WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.			
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	COMPRESSIBILITY	NON-CHICALINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED, ROCK TYPE	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM			
00000000111111111111111111111111111111	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50	INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.			
SYMBOL 000000000000000000000000000000000000	HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	SEDIMENTARY ROCK SEDIME	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.			
Z PASSING GRANULAR SILT- MUCK,	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT			
# 40 DO MYRO MYRI MN COTT C ULAY DEAT	ORGANIC MATERIAL GRANULAR SILT- CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.			
■ 200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.			
LIQUID LIMIT 40 MX41 MN 40 MX41 MN 40 MX41 MN 40 MX41 MN SOILS WITH	LITTLE ORGANIC MATTER	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF			
PLASTIC INDEX 6 MX N.P. 100 MX 101 MN 111 MN 110 MX 110 MX 111 MN 111 MN LITTLE OR HIGHLY	HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE	(V.SL).) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.			
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX No MX MODERATE AMOUNTS OF COLL	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE			
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY ORGANIC	□ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.			
OF MAJOR GRAVEL AND SAND GRAVEL AND SAND SOILS SOILS MATTER	STATIC WATER LEVEL AFTER 24 HOURS.	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MDDERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS, IN	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.			
GEN. RATING FAIR TO SOOT	∇ PW PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.			
AS A EXCELLENT TO GOOD FAIR TO POOR POOR WISUITABLE		DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY			
P.I. OF A-7-5 ≤ L.L 30 : P.I. OF A-7-6 > L.L 30	SPRING OR SEEPAGE	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL	THE STREAM.			
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN			
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT OF DATE TEST BORING SAMPLE	(MOD, SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK, IF TESTED, WOULD YIELD SPT REFUSAL	THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH ND APPRECIABLE MOVEMENT HAS OCCURRED.			
CONSISTENCY (N-VALUE) (TONS/F12)	WITH SOIL DESCRIPTION VST PHT DESIGNATIONS	SEVERE ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO			
GENERALLY VERY LOOSE <4 CRANNII AR LOOSE 4 TO 10	AUGER BORING S- BULK SAMPLE	(SEV.) IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	ITS LATERAL EXTENT.			
MEDIUM DENSE 10 TO 30 N/A	ARTIFICIAL FILL OTHER THAN SS- SPLIT SPOON	IF TESTED, YIELDS SPT N VALUES > 100 BPF	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.			
(NON-COHESIVE) DENSE 30 TO 50 VERY DENSE >50	ROADWAY EMBANKMENTS CORE BORING SAMPLE	VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT	MOTILED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTILING IN SOILS UGUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.			
	INFERRED SOIL BOUNDARIES ST- SHELBY TUBE ST- SHELBY TUBE SAMPLE MONITORING MELL SAMPLE	(V. SEV.) THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN			
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	INFERRED BOOK LINE BS- BOOK SAMPLE	VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF	INTERVENING IMPERVIOUS STRATUM.			
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1	A FIELDMEIER	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.			
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	ALLUVIAL SDIL BOUNDARY INSTALLATION RT- RECOMPACTED SLOPE INDICATOR TRIAXIAL SAMPLE	SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS ALSO AN EXAMPLE.	ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF			
HARD >30 >4	25/825 DIP/DIP DIRECTION OF INSTALLATION OR - ORR SAMPLE	ROCK HARDNESS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.			
TEXTURE OR GRAIN SIZE	ROCK STRUCTURES SPT N-VALUE		SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE			
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	• - SOUNDING ROD REF SPT REFUSAL	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK,	PARENT ROCK.			
DPENING (MM) 4.76 2.0 0.42 0.25 0.075 0.053	ABBREVIATIONS	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND			
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY		TO DETACH HAND SPECIMEN.	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS			
(BLDR.) (COB.) (GR.) (CSE, SD.) (F. SD.) (SL.) (CL.)	AR - AUGER REFUSAL PMT - PRESSUREMETER TEST BT - BORING TERMINATED SD SAND, SANDY	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR			
GRAIN MM 305 75 2,0 0,25 0,05 0,005	CL CLAY SL SILT, SILTY	HARD EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	SLIP PLANE.			
SIZE IN. 12" 3"	CPT - CONE PENETRATION TEST SLI SLIGHTLY CSE COARSE TCR - TRICONE REFUSAL	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL W1TH			
SOIL MOISTURE - CORRELATION OF TERMS	DMT - DILATOMETER TEST	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGISTS PICK.	A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION			
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	DPT - DYNAMIC PENETRATION TEST o - VOID RATIO DRY UNIT WEIGHT	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	WITH 60 BLOWS.			
(ATTEMBERG LIMITS) DESCRIPTION	F FINE W - MOISTURE CONTENT	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.			
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	FOSS FOSSILIFEROUS V VERY FRAC FRACTURED VST - VANE SHEAR TEST	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY:			
LL _ LIOUID LIMIT	FRAGS FRAGMENTS	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.			
PLASTIC SEMISOLID; REQUIRES DRYING TO	MED MEDIUM	FINGERNAIL.	TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.			
RANGE - WET - (W) SEMISOLIDE REDURES UNTING TO ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING BEDDING TERM SPACING IERM THICKNESS				
PLL TERSILE CIPE!	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	TEST THOUSE A PEOPLE A PEOPLE	BENCH MARK: BM# 203, BL Sta. 16+55.48, 30' LT,			
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	CLAY BITS X AUTOMATIC MANUAL	VERY WIDE MORE HAN 10 FEET THICKLY BEDDED 1.5 - 4 FEET	-L- Sta. 22+19.25, 27.5' LT ELEVATION: 264.75 FT			
SL SHRINKAGE LIMIT	MORITE B-	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET	ELEVALUATION: 207-73 FT			
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		VERY CLOSE 0.16 ID TEET THICKLY LAMINATED 0.008 - 0.03 FEET	NOTES:			
HITHIN OF LINUT HOUSTORE	The follow Hobers	INDURATION < 0.008 FEET				
PLASTICITY	CME-45C HARD FACED FINGER BITS	INDUKA I JUN FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.				
PLASTICITY INDEX (PI) DRY STRENGTH	X TUNG-CARBIDE INSERTS	DURDING WITH FINETO FORES NUMEROUS CONTRO				
NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT	LUCING N/ ADVANCED	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; — GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.				
MED. PLASTICITY 16-25 MEDIUM	PORTABLE HOIST TRICONE STEEL TEETH POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;				
HIGH PLASTICITY 26 OR MORE HIGH	TRICONE TIME CARR HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.				
COLOR	IX OTHER CMF-750	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;				
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY)	Cone Bil	DIFFICULT TO BREAK WITH HAMMER.				
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	OTHER OTHER OTHER OTHER	EXTREMELY INDURAȚED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.				

 ID
 STATE PROJECT NO. SHEET NO. TOTAL SHEETS

 B-4299
 33636.1.1
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT SECRETARY

March 24, 2005

STATE PROJECT:

33636.1.1 (B-4299)

F.A. PROJECT:

BRSTP-1006(14)

COUNTY:

Wake

DESCRIPTION:

Bridge No. 255 on -L- (SR 1006) over Echo Branch Creek at

Station 22+70

SUBJECT:

Geotechnical Report – Foundation Investigation

Project Description

A single-span bridge, 70-feet in length with a 70° skew, is proposed on -L- (SR 1006) over Echo Branch Creek to replace the existing structure. The new bridge will be 18 feet longer than the existing structure. The project is located in southern Wake County within the town limits of Garner.

The subsurface investigation was conducted during March of 2005 using an ATV-mounted CME-750 drill machine. Two Standard Penetration Test borings were performed at each of the proposed end bent locations. All borings were advanced until crystalline rock was encountered. Representative soil samples were obtained for visual classification in the field and selected samples were sent to the Materials and Tests Unit for laboratory analysis.

Physiography and Geology

The project is located in relatively flat terrain of the Piedmont Physiographic province. The area is urban, with single-family homes and some businesses located along Old Stage Road. The area along Echo Branch Creek is wooded. Geologically, the project is located within the Raleigh Belt, and is underlain by biotite gneiss and schist.

Soil Properties

Soils encountered at the project site include roadway embankment, alluvial, and residual soils.

Roadway embankment soils were present at both end bent locations and range in thickness from 6.0 to 9.0 feet. At End Bent 1, these soils consist of red-brown, medium stiff, moist, sandy clay (A-7-6) with medium plasticity, and red-brown, soft, moist, sandy silt (A-4). At End Bent 2, embankment soils consist of orange and red-brown, loose, moist, silty sand (A-2-4), and orange and red-brown, soft, moist, sandy clay (A-7-6) with medium plasticity. Embankment soils are underlain by alluvial soils.

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Alluvial soils were encountered at both end bent locations. The alluvial soils range from 3.0 to 9.5 feet in thickness. These soils predominantly consist of gray, very loose to loose, wet, silty sand (A-2-4) and brown to gray, loose to medium dense, wet, coarse sand (A-1-b). Other alluvial soils present are gray, very soft, moist, silty sandy clay (A-6). The alluvial soils were deposited on residual soil and weathered rock.

Residual soils were encountered at End Bent 2 and range from 2.3 to 4.2 feet in thickness. The residual soils consist of green and white, dense, moist, sand (A-2-4) with some mica. The residual soils are underlain by weathered and/or crystalline rock.

Rock Properties

Weathered rock was derived from the underlying metamorphosed bedrock (biotite gneiss and schist), and ranges in thickness from 1.6 feet at boring EB1-B, to as much as 11.3 feet at boring EB2-B. Weathered rock was encountered in each of the borings except for EB2-A. The top of weathered rock ranges in elevation from 244.7 feet at EB2-B to 255.7 feet at EB1-B.

Crystalline rock was encountered at each boring location. The top of crystalline rock ranges in elevation from 233.4 feet at EB2-B to 254.1 feet at EB1-B.

Groundwater

Groundwater was present in all of the borings. The groundwater elevations ranged from 256.4 feet at EB1-A to 258.3 feet at EB2-B. Surface water in Echo Branch Creek was at elevation 256.8 feet (4-20-04).

Notice

This Geotechnical foundation report is based on the bridge survey report for Echo Branch Creek dated October 5, 2004 and the Preliminary General Drawing dated November 24, 2004. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Prepared by,

Jaime Love Pedro

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Prepared by,

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The P. Moniful

Project Geologist

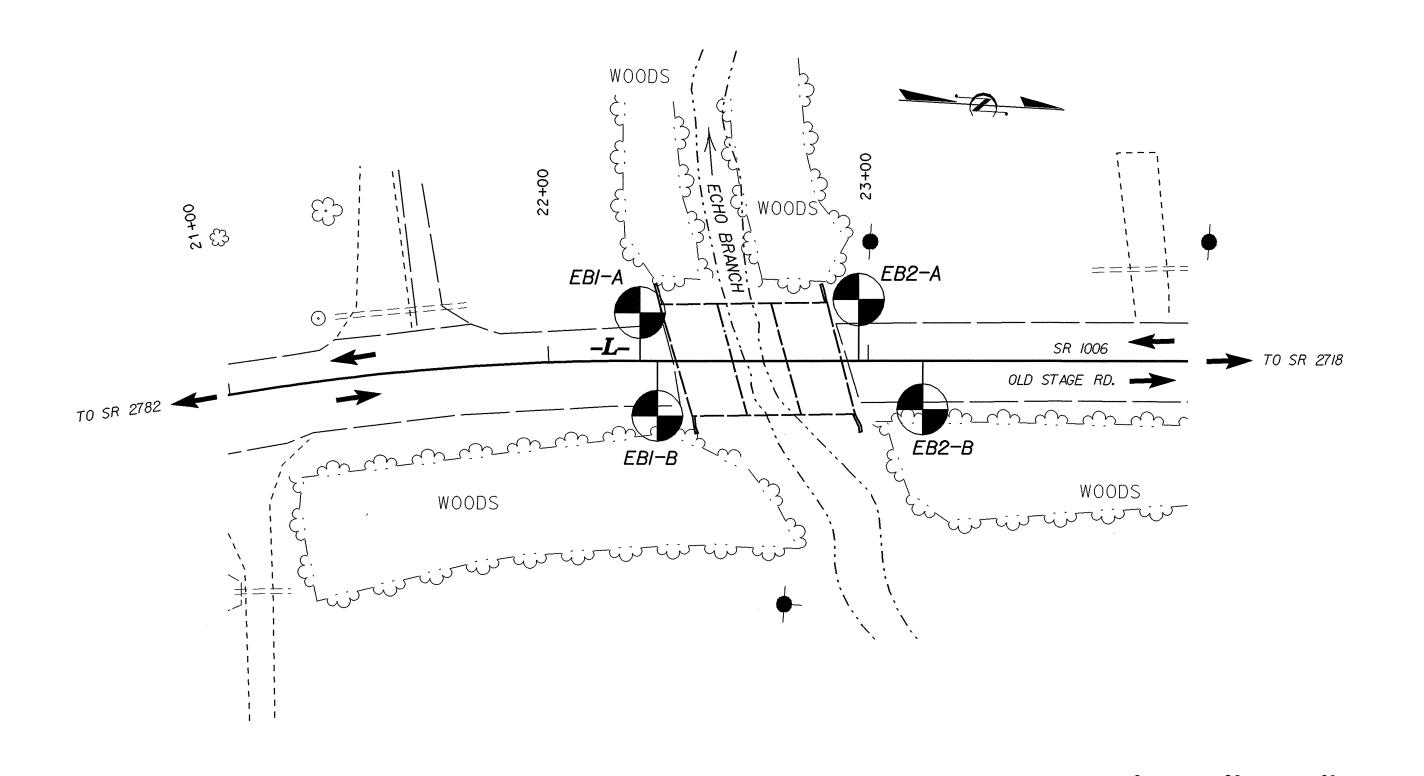


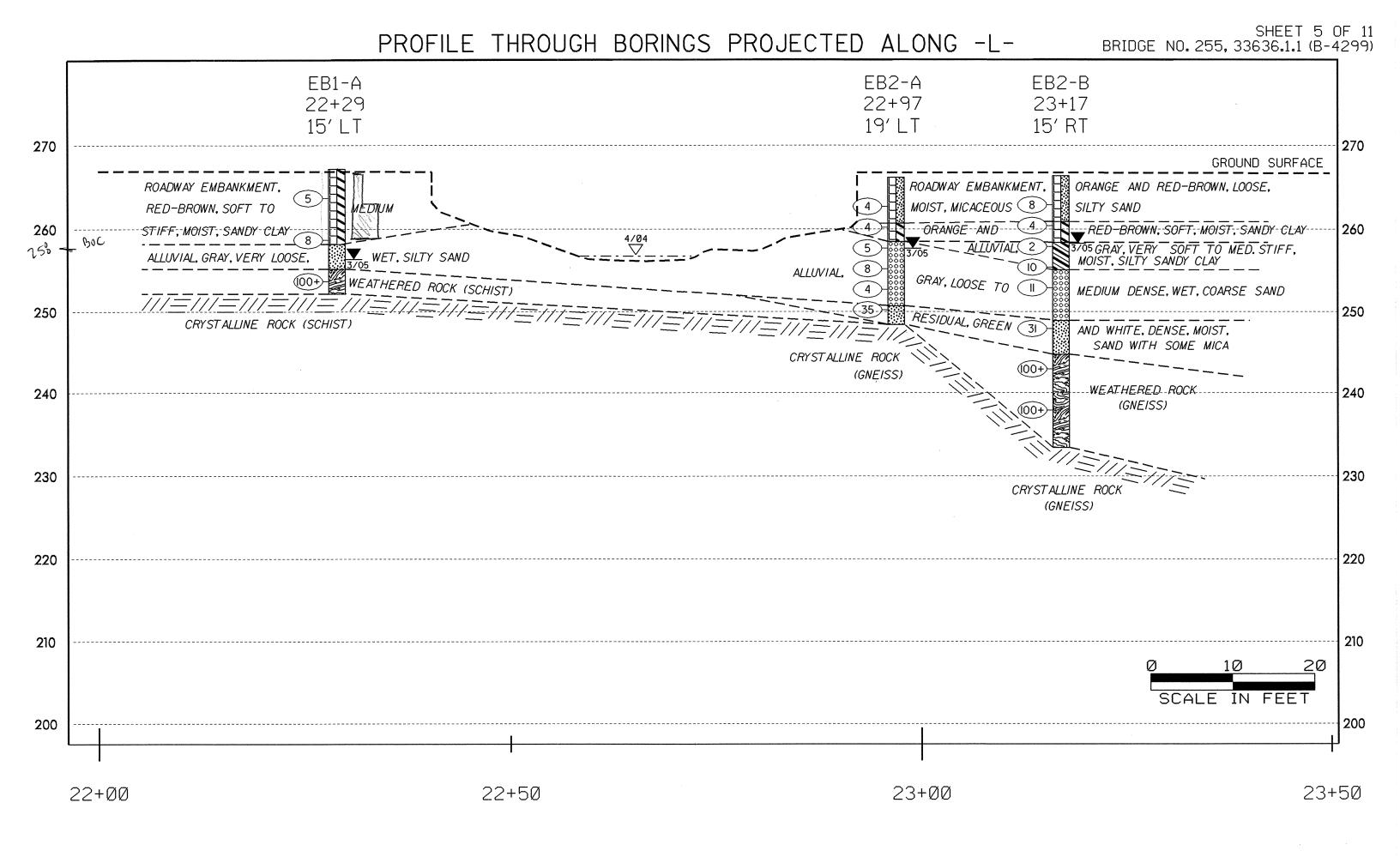
 PROJECT REF. NO.
 SHEET NO.
 TOTAL SHEETS

 33636.1.1 (B-4299)
 4
 11

SCALE IN FEET

TEST SITE PLAN





4299) 270 260 230 240 230 220 250 240 220 210 270 260 250 210 NO. 255, 33636.1. Γ (B-2) Ø. SANDY CLAY, MED. PLASTICITY \Box SILTY SAND MICA SCALE SCALI DENSE, WET BRIDGE **BENT** BEN EB1-B 22+34 17' RT MITHEB2-B 23+17 15′ RT BACK 7 CAPSTALINE ROCK (SWEISS) AHEAD 6' ROADWAY EMBANKMENT. END TO LOOSE, WET, (2 END RED-BROWN, (4) (A) ALLUVIAL, GRAY, VERY SOFT TO MEDIUM STIFF, MOIST, SILTY SANDY CLAY GREEN AND WHITE, DENSE, MOIST, SAND RED-BROWN, LOOSE, MOIST, SILTY SAND ROADWAY EMBANKMENT, ORANGE AND ORAWGE-AND-RED-BROWN, SOFT, MOIST, BROWN TO GRAY, LOOSE TO MEDIUM THROUGH THROUGH CASTALINE POCK CWESS, COARSE SAND 77=77=77= CRYSTALLINE GRAY, VERY LOOSE لى لل PLASTICITY.... GROUND SECTION SECTION EB1-A 22+29 15′LT ROADWAY 5 MED. STIFF, MOIST, EB2-A 22+97 19' LT CROSS **CROSS** (35) ALLUVIAL, RESIDUAL 270 240 230 270 260 250 240 230 220 260 250 220 210 210

SHEET 6 OF II

North Carolina Department of transportation — north Carolina Department of transportation GEOTECHNICAL UNIT BORING LOG

GEOTECHNICAL UNIT BORING LOG

	SHEET 7 OF 11
PROJECT NO. 33636.I.I ID. B-4299 COUNTY WAKE GEOLOGIST J. L. PEDRO	PROJECT NO. 33636.I.I ID. B-4299 COUNTY WAKE GEOLOGIST J. L. PEDRO
SITE DESCRIPTION BRIDGE NO. 255 ON -L- (SR 1006) OVER ECHO BRANCH CREEK GROUND WA	BR SITE DESCRIPTION BRIDGE NO. 255 ON -L- (SR 1006) OVER ECHO BRANCH CREEK GROUND WATER
BORING NO. EBI-A BORING LOCATION 22+29 OFFSET 15'LT ALIGNMENT -L- OHR. DRY	BORING NO. EBI-B BORING LOCATION 22+34 OFFSET 17'RT ALIGNMENT -L- 0 HR. DRY
COLLAR ELEVATION 267.2' NORTHING 711648 EASTING 2102028 24 HR. 10.8	COLLAR ELEVATION 265.7' NORTHING 711656 EASTING 2102059 24 HR. 8.8'
TOTAL DEPTH 15.0' DRILL MACHINE CME-750 DRILL METHOD H.S. AUGERS HAMMER TYPE AUTOMA	
START DATE 3/10/05 COMPLETION DATE 3/10/05 SURFACE WATER DEPTH N/A DEPTH TO ROCK 15.0	START DATE 3/10/05 COMPLETION DATE 3/10/05 SURFACE WATER DEPTH N/A DEPTH TO ROCK 11.6'
DEPTHRIOW COUNTPEN BLOWS PER FOOT SAMPLE TO LESS AND DOCK	DEPTHRIOW COUNTREN BLOWS PED FOOT CAMPLE TO ALL COUNTRED
ELEV. (FT.) 0.5/0.5/0.5/(FT.) 0 25 50 75 100 NUMBER MOI. G DESCRIPTION	ELEV. (FT.) 0.510.510.5(FT.) Q 25 50 75 100 NUMBER MOI. G DESCRIPTION
1 1 1 1 0.5 0.5 10.5 11 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7 mon 0
267.2	265.7 - 265.7
	265.7 + POADWAY FARANKAISHT
265.0 + 3.5 2 2 3 1.0	- II - 十 - I - I - I - I - I - I - I - I
SANDY CLAY.	
1260-0 T	260.0 + SANDY SILT
	-
SS-2 M ■ ALLUVIAL, GRAY, SILTY SAND	T 8.0 WOHWOH 2 1.0 \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
255.0 —	- 255.0 - WEATHERED ROCK
255.0 13.5 22 45 55 0.7	- AUGER-REFUSAL AT
250.0 + ELEVATION 252.2 FEET	250.0 + ON CRYSTALLINE ROCK / / / / / /
THE TONICRYSTALLINE ROCK	
245.0 +	
1245.0 ±	$\mathbb{T}^{245.0} \pm \mathbb{T}^{-1} + \mathbb{T}^{-1} + \mathbb{T}^{-1} = \mathbb{T}^{245.0} \pm \mathbb{T}^{-1} + \mathbb{T}^{-1} = \mathbb{T}^{-1} $
\pm	
240.0 	240.0 —
235.0 +	235.0 +
230.0 \(\frac{1}{2}\)	230.0 +
250.0 ±	
	$oxed{T}$
225.0 +	225.0 +
220.0 +	
<u>+ </u>	
215.0 +	
210.0 +	210.0 +
205.0 +	205.0 +
200.0 +	200.0 +
195.0 +	
190.0 +	190.0 +

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

SHEET 8 OF II PROJECT NO. 33636.1.1 **ID.** B-4299 COUNTY WAKE GEOLOGIST J. L. PEDRO PROJECT NO. 33636.1.1 **ID.** B-4299 COUNTY WAKE GEOLOGIST J. L. PEDRO BRIDGE NO. 255 ON -L- (SR 1006) OVER ECHO BRANCH CREEK GROUND WATER BRIDGE NO. 255 ON -L- (SR 1006) OVER ECHO BRANCH CREEK SITE DESCRIPTION GROUND WATER SITE DESCRIPTION OFFSET 19' L.T. ALIGNMENT -L-HR. 8.8' BORING NO. EB2-B BORING LOCATION 23+17 OFFSET 15' RT BORING NO. EB2-A BORING LOCATION 22+97 ALIGNMENT -L-) HR. 8.3' COLLAR ELEVATION 266.2' NORTHING 711716 **EASTING** 2102020 24 HR. 8.5' COLLAR ELEVATION 266.4' NORTHING 711738 **EASTING** 2102052 24 HR. 8.1 TOTAL DEPTH 17.8 DRILL MACHINE CME-750 DRILL METHOD H.S. AUGERS HAMMER TYPE AUTOMATIC TOTAL DEPTH 33.0' DRILL MACHINE CME-750 DRILL METHOD H.S. AUGERS HAMMER TYPE AUTOMATIC SURFACE WATER DEPTH N/A **START DATE** 3/10/05 START DATE 3/10/05 COMPLETION DATE 3/10/05 DEPTH TO ROCK 17.8' COMPLETION DATE 3/10/05 SURFACE WATER DEPTH N/A DEPTH TO ROCK 33.0' DEPTHIBLOW COUNTIPEN. BLOWS PER FOOT DEPTH|BLOW COUNT|PEN. BLOWS PER FOOT SAMPLE SAMPLE SOIL AND ROCK SOIL AND ROCK ELEV. ELEV. 75 100 NUMBER DESCRIPTION 100 NUMBER DESCRIPTION (FT.) |0.510.510.5(FT.)|? 25 (FT.) |0.510.510.51(FT.)| P ∕MOI. ∕MOI. 266.4 265.0 266.2 265.0 ROADWAY EMBANKMENT. ROADWAY EMBANKMENT. ORANGE-BROWN. 3.5 2 3 5 1.0 RED-BROWN, SILTY SAND М 2 3.5 2 2 1.0 SS-5 М MICACEOUS SILTY SAND 2 2 2 1.0 2 6.0 RED-BROWN, SANDY CLAY, MEDIUM PLASTICITY 2 1.0 6.0 WOH SS-6 М ORANGE-BROWN, SANDY CLAY. 260.0 260.0 M MEDIUM PLASTICITY W 2 2 2 3 8.5 **WOHWOH** 1.0 1.0 SS-7 8.5 SS-9 ALLUVIAL. GRAY, SILTY CLAY ALLUVIAL. ·HOM: 3 6 1.0 W 5 1.0 W 3 255.0 11.0 SS-10 BROWN TO GRAY. 13.5 5 6 1.0 W 2 COARSE SAND 4 13.5 2 .0 W TAN AND BROWN, COARSE SAND - 16.0 | 22 | 21 14 SS-8 М RESIDUAL, GREEN AND WHITE, SILTY SAND WITH SOME MICA 250.0 250.0 RESIDUAL. 9 11 | 20 1.0 18.5 М AUGER-REFUSAL AT GREEN AND WHITE, SILTY SAND WITH SOME MICA ELEVATION 248.4 FEET 245.0 245.0 ON-CRYSTALLINE ROCK -23.5 30 70 0.8 100+ - (GNEISS)-240.0 240.0 WEATHERED ROCK (GNEISS) 28.5 100 100+-235.0 235.0 - - AUGER- REFUSAL AT -ELEVAJION 1233.4 FEET 1 230.0 230.0 ON CRYSTALLINE ROCK - (GNEISS) - -225.0 225.0 220.0 220.0 215.0 215.0 210.0 210.0 205.0 205.0 200.0 200.0 195.0 195.0 190.0 190.0

PROJ. NO. - 33636.1.1 ID NO. - B-4299 COUNTY - WAKE

EB1-A

			S	OIL T	TE.	ST	RE	SUL	TS						
SAMPLE			DEPTH	AASHTO				% BY W	/EIGHT		% PAS	SING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-1	15' LT	22+29	3.5-5.0	A-7-6(6)	45	19	22.0	21.2	14.3	42.4	82	72	49	-	-
SS-2	15' LT	22+29	9.0-10.0	A-2-4(0)	16	NP	32.1	42.2	13.5	12.1	91	69	28	-	-

SHEET 9 OF 11

EB1-B

EBI-B			S	OIL 7	TE:	ST	RE	SUL	LTS						
SAMPLE			DEPTH	AASHTO				% BY W	VEIGHT		% PAS	SING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-3	17' RT	22+34	3.0-4.5	A-4(0)	28	9	25.9	35.6	14.3	24.2	86	73	38	-	-
SS-4	17' RT	22+34	8.0-9.5	A-2-4(0)	26	8	25.5	42.6	9.7	22.2	92	80	34	•	-

EB2-A

			S	OIL T	TE.	ST	RE	SUL	TS						
SAMPLE			DEPTH	AASHTO				% BY W	/EIGHT		% PAS	SING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-5	19' LT	22+97	3.5-5.0	A-2-4(0)	29	5	40.0	32.3	11.5	16.2	89	68	28	-	-
SS-6	19' LT	22+97	6.0-7.5	A-7-6(5)	42	17	19.2	30.3	16.2	34.3	90	81	49		-
SS-7	19' LT	22+97	8.5-10.0	A-1-b(0)	25	NP	73.7	18.2	0.0	8.1	81	35	8	•	-
SS-8	19' LT	22+97	16.0-17.5	A-2-4(0)	28	NP	40.4	45.5	8.1	6.1	99	83	18	-	-

EB2-B

EDZ-D															
			S	OIL 7	TE:	ST	RE	SUL	TS						
SAMPLE			DEPTH	AASHTO				% BY W	/EIGHT		% PAS	SING (S	(IEVES	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-9	15' RT	23+17	8.5-10.0	A-6(2)	30	13	23.4	32.9	17.4	26.3	95	85	45	•	-
SS-10	15' RT	23+17	11.3-12.5	A-1-b(0)	24	NP	70.1	23.4	0.4	6.1	77	43	6	-	-

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 33636.1.1 ID: B-4299 COUNTY: Wake
DESCRIPTION(1): Bridge No. 255 on -L- (SR 1006) over Echo Branch Creek
at -L- Station 22+70
INFORMATION ON EXISTING BRIDGE ✓ field inspection Information obtained from: ☐ microfilm (Reel:Pos:) ✓ other: Hydro Report
BR. NO.: 255 BR. LENGTH: 52' NO. BENTS: 4 NO. BENTS IN: CHANNEL: 2 FLOODPLAIN: 2
FOUNDATION TYPE: Timber Piles
EVIDENCE OF SCOUR(2): ABUTMENTS OR END BENT SLOPES: None INTERIOR BENTS: Bent 1 has some scour around the piles
CHANNEL BED: None CHANNEL BANKS: None
EXISTING SCOUR PROTECTION:
TYPE(3): Rip-rap at End Bent 2 and Bent 1; some piles on Bent 1 and 2 have poured concrete box at base
EXTENT(4): End Bent 2 rip-rap covers 40'x6', Bent 1 rip-rap is scattered, concrete around 2 or 3 piles
EFFECTIVENESS(5): Effective
OBSTRUCTIONS(6) (DAMS,DEBRIS,ETC.): None
DESIGN INFORMATION CHANNEL BED MATERIAL(7): Alluvial, gray and brown, silty and coarse sand (SS-2 and SS-10)
CHANNEL BANK MATERIAL(8): Alluvial, brown to gray, loose, sand (SS-7)
CHANNEL BANK COVER(10): Grass, brush, and trees
FLOOD PLAIN WIDTH(11): +/- 150 feet
FLOOD PLAIN COVER(12): Grass, brush, and trees

SHEET 10 OF 11
DESIGN INFORMATION CONT.
STREAM IS: X DEGRADINGAGGRADING (13)
OTHER OBSERVATIONS AND COMMENTS:
CHANNEL MIGRATION TENDENCY (14): South toward End Bent 1
GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(15):
Geotechnical analysis indicates the maximum anticipated scour
elevation occurs at an elevation of 252.5 feet.
This is 2.7 feet higher than the Hydraulic Unit's predicted scour elevation.
REPORTED BY: Jame Love Pedro DATE: 3-10-05

INSTRUCTIONS

- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE GIVING ROUTE NUMBER AND BODY OF WATER CROSSED.
- (2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
- 3) NOTE ANY EXISTING SCOUR PROTECTION (RIR RAP, ETC.)
- (4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
- 5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
- (6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
- (7) DESCRIBE THE CHANNEL BED MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION,
- DESCRIBE THE CHANNEL BANK MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
- (9) DESCRIBE THE FOUNDATION BEARING MATERIAL.
- (10) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.
- (11) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
- (12) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
- (13) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING
- (14) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE LATERALLY DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
- (15) GIVE THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS THE RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. IF THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SCOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY; CORE RECOVERY PERCENTAGE; PERCENTAGE RQD; DIFFERENTIAL WEATHERING, SHEAR STRENGTH; OBSERVATIONS AT EXISTING STRUCTURES; OTHER TESTS DEEMED APPROPRIATE; AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

SITE PHOTOGRAPH

(BRIDGE NO. 255 ON -L- (SR 1006) OVER ECHO BRANCH CREEK)



View looking due east and upstream